II. REMARKS

Claims 5 and 11 have been amended, and new claims 15-17 have been added. Specifically, claims 5 and 11 have been amended to delete the word "smoothly," which has no further limiting effect on the scope of this claim.

New claim 15 incorporates subject matter from previous claims 1, 5, 6 and 7, and additionally recites "the phenol resin forms a resin film on each powder grain that thermally decomposes at 200 to 400°C" and "preheating the impregnated ceramic core to about 200 to 400°C to thermally decompose the resin film" as supported on page 6, lines 6-12, and on page 7, lines 7-11, of Applicant's specification as originally filed. New claim 16 depends on claim 15, and further recites "confining the ceramic core in wax and then forming a heat-resistant shell around the ceramic core confined in wax" as supported by previous claim 8. New claim 17 depends upon claim 16, and additionally recites "said oxide ceramics reinforcing liquid comprises yttrium oxide sol or niobium oxide sol, or a combination of yttrium oxide sol and niobium oxide sol" as supported on page 6, lines 22-25, of Applicant's specification as originally filed.

The present amendment adds no new matter to the application.

A. The Invention

The present invention pertains broadly to a method of manufacturing a heat-resistant ceramic core with a three-dimensional shape as may be used to cast a hollow flow passage by precision casting. In an embodiment of the present invention, a method of manufacturing a heat-resistant ceramic core with a three-dimensional shape is provided that includes the steps recited by independent claim 1. In another embodiment of the present invention, a method of manufacturing a heat-resistant ceramic core with a three-dimensional shape is provided that includes the steps recited by independent claim 9. In another embodiment of the present

invention, a method of manufacturing a heat-resistant ceramic core with a three-dimensional shape is provided that includes the steps recited by independent claim 15. Various other embodiments, in accordance with the present invention, are recited in the dependent claims.

An advantage provided by the various embodiments of the present invention is that even if the shape of the ceramic core is complicated, it may still be easily manufactured. Another advantage provided by the various embodiments of the present invention is that a ceramic core formed by powder lamination is made more heat-resistant due to impregnation with ceramic reinforcing liquid and by sintering the impregnated ceramic core. In addition, as taught by the present specification at page 8, lines 1-2, sintering at 1100 degrees centigrade or more advantageously results in a material with high heat resistance.

B. The Rejections

Claims 5, 6, 11 and 12 stand rejected under 35 U.S.C. § 112, second paragraph, as indefinite.

Claims 1, 2, 5-7 and 9-13 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Vail et al. (N.K. Vail et al., *Ceramic Structures by Selective Laser Sintering of Microencapsulated, Finely Divided Ceramic Materials*, Solid Freeform Fabrication Symposium Proceeding, University of Texas, pp. 124-130, 1992, hereafter the "Vail Article") in view of Osawa et al. (U.S. Patent 5,702,501, hereafter the "Osawa Patent") and Kaneko et al. (U.S. Patent 3,919,755, hereafter the "Kaneko Patent"). Claims 8 and 14 stand rejected under 35 U.S.C. § 103(a) as unpatentable over the Vail article in view of the Osawa Patent and the Kaneko Patent, and further in view of Gartland et al. (U.S. Patent 4,986,333, hereafter the "Gartland Patent").

In view of the present amendment, Applicant respectfully traverses the Examiner's rejections and requests reconsideration and allowance of the claims for the following reasons.

C. Applicant's Arguments

In view of the present amendments, claims 1, 2 and 5-17 are now in compliance with 35 U.S.C. § 112.

i. The Section 103 Rejections

A prima facie case of obviousness requires a showing that the scope and content of the prior art teaches each and every element of the claimed invention, and that the prior art provides some teaching, suggestion or motivation to combine the references to produce the claimed invention. In re Oetiker, 24 U.S.P.Q.2d 1443 (Fed. Cir. 1992); In re Vaeck, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991). In this case, the Examiner has failed to establish a prima facie case of obviousness against Applicant's claimed invention because neither the Vail Article, the Osawa Patent, the Kaneko Patent, the Gartland Patent, U.S. Patent 4,615,875 to Gonczy (hereafter the " Gonczy Patent"), nor U.S. Patent 6,444,600 to Baek et al. (hereafter, the "Baek Patent") , either alone or in combination, teach or suggest, that "the oxide ceramics reinforcing liquid is impregnated in a pressure reduced vessel" as recited in independent claims 1, 9 and 15.

As an initial matter, while the Examiner characterizes his alleged Section 103 rejection standing against independent claims 1 and 9 as the combination of Vail, Osawa and Kaneko (Office Action, dated July 6, 2007, at 3, lines 1-4), Applicant contends that the alleged Section 103 rejection is more accurately characterized as the combination of Vail, Baek, Gonczy, Osawa, and Kaneko. Likewise, while the Examiner characterizes his alleged Section 103 rejection standing against claims 8 and 15 as the combination of Vail, Osawa, Kaneko, and Gartland (Office Action, dated July 6, 2007, at 5, lines 8-9), Applicant contends

that the alleged Section 103 rejection is more accurately characterized as the combination of Vail, Baek, Gonczy, Osawa, Kaneko and Gartland. Specifically, the Examiner relies upon the Gonczy Patent to allegedly show that it was known, when using an alumina sol as an impregnation liquid, that the impregnated article must be heated to above 1100°C for sintering (See Office Action, dated July 6, 2007, at 7, lines 11-14). With respect to the Baek Patent, the Examiner relies upon this patent to allegedly show that colloidal silica and alumina were known to be inorganic binders (Office Action, dated July 6, 2007, at 3, lines 11-13).

In view of the above facts, Applicant contends that the Examiner's Section 103 rejection of claims 1 and 9 is more accurately characterized as a combination of Vail, Baek, Gonczy, Osawa, and Kaneko, and that the Examiner's Section 103 rejection of claims 8 and 14 is more accurately characterized as a combination of Vail, Baek, Gonczy, Osawa, Kaneko and Gartland.

ii. <u>The Vail Article</u>

The Vail Article discloses a selective laser sintering process to realize strengths (See Abstract of the Vail Article), wherein laser sintering is performed <u>before</u> impregnation, at air and bed temperatures below 100 °C (See Table 5). Furthermore, after infiltration (analogous to the impregnation claimed in the present invention), the Vail Article discloses firing at no more than 400 °C to remove moisture (page 126, see paragraph titled "*Post-Processing of SLS Parts*"). The Vail Article also discloses firing some samples at higher temperatures in accordance with the firing cycle shown in Figure 1. However, the Vail Article does not teach, or even suggest, firing to achieve sintering. Consequently, the Vail Article does not teach, or even suggest, "<u>sintering the impregnated ceramic core</u>" at any temperature!

As admitted by the Examiner, the Vail Article does not teach, or even suggest, (1)

"sintering the impregnated ceramic core in an atmosphere at 1100 degrees centigrade or more" and (2) "the impregnated ceramic core is placed in heat-resistant powder to prevent the impregnated ceramic core from deforming" as recited by independent claims 1, 9 and 15 (Office Action, dated April 3, 2007, at 2, lines 17-18; and Office Action, dated July 6, 2007, at 3, lines 16-17).

However, these are not the only deficiencies in the disclosure of the Vail Article. As also admitted by the Examiner (Office Action, dated July 6, 2007, at 3, lines 11-13; at 4, lines 8-9; at 5, lines 1-7; at 5, lines 10-12), the Vail Article does not teach, or suggest, (3) "the oxide ceramics reinforcing liquid is impregnated in a pressure reduced vessel" as recited by independent claims 1, 9 and 15. The Vail Article also does not teach, or suggest, that (4) "the ceramics reinforcing liquid is an inorganic binder, and during impregnation of the ceramic core the inorganic binder replaces air in the ceramic core" as recited in claims 5, 11 and 15, that (5) "impregnation of the ceramic core with inorganic binder occurs over about 5 to 10 minutes" as recited by claims 6, 12 and 15, and the method embodiment that includes (6) "confining the ceramic core in wax and then forming a heat-resistant shell around the ceramic core confined in wax" as recited by claims 8, 14 and 16.

The Vail Article also does not teach, or suggest, (7) "the phenol resin forms a resin film on each powder grain that thermally decomposes at 200 to 400°C" and "preheating the impregnated ceramic core to about 200 to 400°C to thermally decompose the resin film" as recited by independent claim 15, and (8) "said oxide ceramics reinforcing liquid comprises yttrium oxide sol or niobium oxide sol, or a combination of yttrium oxide sol and niobium oxide sol" as recited by claim 17.

iii. The Osawa Patent

The Osawa Patent discloses a "clayish composition for molding shaped article of

noble metal and method for production of sintered article of noble metal" wherein the clayish composition consists essentially of a noble metal powder, starch and a water-soluble cellulose resin as organic binder and water (See Abstract of the Osawa Patent). The Osawa Patent discloses that the contents of the starch and the water-soluble cellulose resin each fall in the range of 0.02-3.0% by weight, based on the total amount of the organic binder and the noble metal powder (See Abstract). The Osawa Patent also discloses a method for producing the sintered article of noble metal that consists essentially of a step for producing the clayish composition mentioned above, a step of molding the clayish composition in a desired shape, a step of drying the molded article and a step of sintering the dried molded article (See Abstract). However, the Osawa Patent does not teach, or suggest, impregnating binder into a ceramic core. Instead, the Osawa Patent discloses shaping a clayish composition into a desired shape, which may create many voids in the material (col. 3, lines 60-65; and col. 5, lines 8-25).

The Osawa Patent also discloses that in other methods a clayish molded article may be buried in a mass of ceramic powder so that the ceramic powder may provide support for the article during sintering and heating (col. 2, lines 23-34). However, the Osawa Patent further discloses that methods employing such a ceramic powder for support are undesirable because they require a great amount of energy for sintering and the method is plagued by uneven sintering due to non-uniform temperatures (col. 2, lines 35-44). The Osawa Patent does not teach, or suggest, "sintering the impregnated ceramic core" at any temperature!

The Osawa Patent also does not teach, or even suggest, (1) "sintering the impregnated ceramic core in an atmosphere at 1100 degrees centigrade or more," and, as admitted by the Examiner (Office Action, dated July 6, 2007, at 4, lines 8-9), the Osawa Patent does not teach, or suggest, (2) "the oxide ceramics reinforcing liquid is impregnated in a pressure reduced vessel" as recited by independent claims 1, 9 and 15. As also admitted by the

Examiner (Office Action, dated July 6, 2007, at 3, lines 11-13; at 5, lines 1-7 and lines 10-12), the Osawa Patent also does not teach, or suggest, that (3) "the ceramics reinforcing liquid is an inorganic binder, and during impregnation of the ceramic core the inorganic binder replaces air in the ceramic core" as recited in claims 5, 11 and 15, that (4) "impregnation of the ceramic core with inorganic binder occurs over about 5 to 10 minutes" as recited by claims 6, 12 and 15, and the method embodiment that includes (6) "confining the ceramic core in wax and then forming a heat-resistant shell around the ceramic core confined in wax" as recited by claims 8, 14 and 16.

The Osawa Patent also does not teach, or suggest, (7) "the phenol resin forms a resin film on each powder grain that thermally decomposes at 200 to 400°C" and "preheating the impregnated ceramic core to about 200 to 400°C to thermally decompose the resin film" as recited by independent claim 15, and (8) "said oxide ceramics reinforcing liquid comprises yttrium oxide sol or niobium oxide sol, or a combination of yttrium oxide sol and niobium oxide sol" as recited by claim 17.

iv. <u>The Kaneko Patent</u>

The Kaneko Patent discloses a "method of making a high-strength heat-insulating casting," which results in the production of a high-strength heat-insulating casting consisting of a flexible ceramic molded liner product onto which a metal article has been cast from molten metal, after which the liner has been impregnated with a heat-resistant binder (See Abstract of the Kaneko Patent). Thus, the Kaneko Patent discloses a flexible molded liner on a metallic article. A person of ordinary skill in the art would immediately realize that the particles of the flexible ceramic are loosely bonded (See, e.g., col. 1, lines 52-57). Furthermore, the Kaneko Patent discloses that the ceramic molded liner must not be impregnated with heat-resistant binder before casting it in molten metal because the ceramic

molded liner will have a high modulus of elasticity or bending strength rendering it unsuitable for metal casting (col. 2, lines 17-26).

Thus, the ceramic molded liner of Kaneko is not an impregnated core used for casting. Rather, Kaneko discloses an unimpregnated ceramic molded liner that is used for casting, and then after casting the liner is impregnated with a heat-resistant binder. The ceramic molded liner of Kaneko is only used for casting in its unimpregnated state, and Kaneko actually teaches away from using the ceramic molded liner for casting in its impregnated state. In other words, a person of ordinary skill in the art would conclude that the flexible ceramic molded liner of Kaneko cannot be impregnated in a pressure reduced vessel without the casting already present on the liner. On the other hand, the present invention relates to a heat-resistant ceramic core that must be impregnated in a pressure reduced vessel without the casting already in place.

The Kaneko Patent also discloses that while a flexible ceramic cast in metal may be impregnated with a heat-resistant binder by brush, sprayer, immersion in a binder solution, impregnation in a vacuum, or pressurized impregnation, the selection is made based on the porosity of the ceramic and the viscosity of the heat-resistant binder (col. 2, lines 27-34). The Examiner has not established that requisite ceramic porosity and binder viscosity characteristics meriting the selection of impregnation in a vacuum have been satisfied. In fact, the examples disclosed by Kaneko employ brushing (Example 1) and immersion in binder solution (Example 2). The Kaneko Patent does not teach, or suggest, what combination of ceramic porosity and binder viscosity characteristics are necessary in order to lead a person of ordinary skill in the art to select impregnation in a vacuum.

For all of the above reasons, while the Kaneko Patent discloses impregnation in a vacuum when ceramic porosity and binder viscosity conditions merit application of a vacuum impregnation method, the Kaneko Patent fails to disclose the ceramic porosity and binder

viscosity conditions that justify the application of impregnation in a vacuum.

v. The Gonczy Patent

The Gonczy Patent discloses a "process for preparing high purity alpha-alumina" that is a high purity alumina with a low sodium content and with a friable, easily ball milled structure produced through a modified sol-gel procedure that includes digestion of the contaminant containing aluminum metal with hydrochloric acid in the presence of excess aluminum, removal of the contaminants, seeding the resulting sol with high purity alumina, drying to a solid, and then calcining the seeded sol solids to produce high purity alpha alumina (See Abstract of the Gonczy Patent). The Gonczy Patent does not pertain to any kind of ceramic and has no relevance to the subject matter of the claims of the above-captioned application. Instead, the Gonczy Patent pertains to processing alumina to make substrate chips for circuitry substrates used on computers, switches and calculators (col. 1, lines 6-12).

The Examiner relies upon the Gonczy Patent to teach, or suggest, "sintering...in an atmosphere at 1100 degrees centigrade or more" as recited in independent claims 1 and 9 of the present application (Office Action, dated April 3, 2007, at 2, line 19, to at 3, line 4; Office Action, dated July 6, 2007, at 3, line 17, to at 4, line 5). However, the Gonczy Patent, which does not pertain to any type of ceramic, discloses calcining (not sintering) seeded alumina sol product (a metal, not a ceramic) at 1200°C to effect a change in the phase of the metal to the alpha phase. A person of ordinary skill in the art would know that the "alpha phase" is a structure of a metal and not of a ceramic.

In sum, the Gonczy Patent discloses calcining alumina (a metal) at 1200°C to effect a transformation in metal phase to the alpha phase. The Gonczy Patent does not teach, or suggest, sintering a ceramic at 1200°C as the Examiner contends. In fact, the Gonczy Patent

is not even relevant to the art of manufacturing a ceramic core.

vi. The Baek Patent

The Baek Patent discloses a "high strength light-weight ceramic insulator," and in particular discloses a method for manufacturing a high strength light-weight ceramic insulator wherein colloidal silica or colloidal alumina is employed as an inorganic binder, and a methyl cellulose or a liquid-phase organic polymer is employed as an organic binder, and both are added to an alumina-silica-based fiber containing zirconia, then a concentration thereof is adjusted, a slurry is vacuum-molded, and drying and heating are carried out, thereby fabricating the ceramic insulator (See Abstract of the Baek Patent). The Baek Patent discloses a method for fabricating a high strength light-weight ceramic insulator by artificially selectively positioning an inorganic binder to a contact point of heat-resisting ceramic fibers. (See Abstract). The Baek Patent fails to make up any of the deficiencies in the disclosures of the Vail Article, the Osawa Patent, the Kaneko Patent and the Gonczy Patent.

vii. The Gartland Patent

The Gartland Patent discloses a "method of supporting a core in a mold," wherein a ceramic core is located within a ceramic mold by the insertion of recrystallized alumina pins through wax encasing the core prior to encasing the whole in a ceramic slurry, and on the subsequent removal of the wax, a molten metal, i.e. superalloy, is injected into the resulting space, wherein the recrystallized alumina pins remain intact during the casting process substantially increasing the success rate of achieving accurate core location during casting solidification (See Abstract of the Gartland Patent).

viii. Summary of the Disclosures

The Gonczy Patent is not relevant to the subject matter of the present invention because this patent pertains to the processing of alumina for electronic circuitry and has absolutely nothing to do with manufacturing a ceramic core. In fact, the Gonczy Patent specifically discloses calcining alumina (a metal) at 1200°C to effect a transformation in metal phase to the alpha phase. The Gonczy Patent has absolutely nothing to do with sintering a ceramic core. Thus, the Gonczy Patent is not only non-analogous art, it is completely irrelevant to the subject matter of the present claims. The Examiner has not addressed this defect in the Section 103 rejection (See Amendment (B), of record, at 11, line 3, to at 4, line 1).

The Vail Article discloses a selective laser sintering process to realize strengths, wherein laser sintering is performed before impregnation, at air and bed temperatures below 100 °C, and then after infiltration (analogous to the impregnation claimed in the present invention) firing at no more than 400 °C to remove moisture.

The Osawa Patent discloses a clayish composition for molding shaped article of noble metal and method for production of sintered article of noble metal, wherein the clayish composition consists essentially of a noble metal powder, starch and a water-soluble cellulose resin as organic binder and water. The Osawa Patent does not teach, or suggest, impregnating a ceramic core with an inorganic binder.

The Kaneko Patent discloses a ceramic molded liner that is casted with metal, and the metal casted ceramic molded liner is impregnated with a heat resistant binder by brushing or by immersion in a solution of the heat resistant binder. The Kaneko Patent specifically teaches away from impregnating the ceramic molded liner before casting with metal. Thus, the Kaneko Patent actually teaches away from the present invention, which produces a sintered impregnated ceramic core that is used for precision casting. While the Kaneko

Patent mentions impregnation under vacuum when conditions of ceramic porosity and binder viscosity merit the application of impregnation under vacuum, the Kaneko Patent fails to disclose what ceramic porosity and binder viscosity conditions justify the use of impregnation by vacuum.

The Baek Patent discloses a method for manufacturing a high strength light-weight ceramic insulator wherein colloidal silica or colloidal alumina is employed as an inorganic binder, a methyl cellulose or a liquid-phase organic polymer is employed as an organic binder, and both the inorganic and organic binders are added to an alumina-silica-based fiber containing zirconia, then concentration is adjusted, the slurry is vacuum-molded, and dried and heated, thereby fabricating the ceramic insulator.

The Gartland Patent discloses a method of supporting a core in a mold, wherein a ceramic core is located within a ceramic mold by the insertion of recrystallized alumina pins through wax encasing the core prior to encasing the whole in a ceramic slurry, followed by the subsequent removal of the wax and injection of a molten metal into the resulting space, wherein the recrystallized alumina pins remain intact during the casting process.

The Vail Article, the Osawa Patent, the Kaneko Patent, the Gonczy Patent, the Baek Patent and the Gartland Patent, either alone or in combination, still fail to teach, or suggest, (1) "sintering the impregnated ceramic core in an atmosphere at 1100 degrees centigrade or more" as recited in independent claims 1, 9 and 15; (2) "the oxide ceramics reinforcing liquid is impregnated in a pressure reduced vessel" as recited by independent claims 1, 9 and 15; (3) "the ceramics reinforcing liquid is an inorganic binder, and during impregnation of the ceramic core the inorganic binder replaces air in the ceramic core" as recited in claims 5, 11 and 15; and (4) "impregnation of the ceramic core with inorganic binder occurs over about 5 to 10 minutes" as recited by claims 6, 12 and 15.

The Vail Article, the Osawa Patent, the Kaneko Patent, the Gonczy Patent, the Baek Patent and the Gartland Patent, either alone or in combination, also fail to teach, or suggest, (5) "the phenol resin forms a resin film on each powder grain that thermally decomposes at 200 to 400°C" and "preheating the impregnated ceramic core to about 200 to 400°C to thermally decompose the resin film" as recited by independent claim 15, and (8) "said oxide ceramics reinforcing liquid comprises yttrium oxide sol or niobium oxide sol, or a combination of yttrium oxide sol and niobium oxide sol" as recited by claim 17.

For all of the above reasons, the Examiner has not established a prima facie case of obviousness against claims 1, 2 and 5-17 of the above-captioned application.

ix. The Official Notice

The Examiner contends that it is known in the art that

> "the amount of time required to complete an impregnation step is dependent on many factors, including, but not limited to, the size of the article to be impregnated, the viscosity of the impregnating liquid, the force applied pulling the liquid into the article (i.e., how much the pressure in the vessel is reduced), and the degree of impregnation desired among other factors" (Office Action, dated July 6, 2007, at 5, lines 1-7).

To the extent that the Examiner is taking "Official Notice" with respect to the above assertions of fact, Applicant objects. Specifically, Applicant reminds the Examiner that the Administrative Procedure Act requires the Examiner's rejections to employ "reasoned decision making" based on evidence from a fully developed administrative record. In re Lee, 61 U.S.P.Q.2d 1430, 1433 (Fed. Cir. 2002). Patentability determinations that are based on what the Examiner believes is "basic knowledge" and "common sense," and that otherwise lacks substantial evidentiary support, are impermissible. In re Zurko, 59 U.S.P.Q.2d 1693, 1697 (Fed.Cir. 2001). Therefore, Applicant respectfully traverses the Examiner's Section 103 rejection of claims 6, 12 and 15 on the ground that the "Official Notice" lacks

"substantial evidentiary support." Therefore, the Examiner must now adduce substantial evidentiary support (e.g., produce a prior art reference) with respect to the subject matter claimed, or withdraw the Section 103 rejection standing against claim 6, 12 and 15.

x. Failure to Justify the Combination of Disclosures

A proper rejection under Section 103 also requires showing (1) that the prior art would have suggested to a person of ordinary skill in the art that they should make the claimed device or carry out the claimed process, (2) that the prior art would have revealed to a person of ordinary skill in the art that in so making or doing, there would have been a reasonable expectation of success, and (3) both the suggestion and the reasonable expectation of success must be found in the prior art and not in the applicants' disclosure. In re Vaeck, 20 U.S.P.Q.2d 1438, 1442 (Fed. Cir. 1991). Furthermore, it is insufficient that the prior art discloses the components of an invention, either separately or used in other combinations; there must be some teaching, suggestion, or incentive to make the combination made by the inventor. Northern Telecom, Inc. v. Datapoint Corporation, 15 U.S.P.Q.2d 1321, 1323 (Fed. Cir. 1990). It is impermissible to employ individual references as a mosaic to recreate a facsimile of the claimed invention. Id. In this case, the Examiner has employed no less than six unrelated disclosures plus an "Official Notice" to form a mosaic in an attempt to impermissibly recreate a facsimile of the claimed invention.

Specifically, the Vail Article discloses impregnation after sintering with a laser, and the Osawa Patent does not disclose any kind of impregnation process whatsoever. Thus, the Vail Article and the Osawa Patent do not teach, or suggest, "sintering the impregnated ceramic core" at any temperature. The Kaneko Patent discloses impregnation after metal casting and actually teaches away from using an impregnated ceramic core for metal casting. Consequently, no combination of the Vail Article, the Osawa Patent and the Kaneko Patent can

teach, or suggest, a method that produces a sintered impregnated ceramic core. Assuming, *arguendo*, that the combination of the Vail Article, the Osawa Patent and the Kaneko Patent were made (which is a combination lacking a proper motivation), the core would be sintered both before (per Vail) and after (per Kaneko) impregnation. A person of ordinary skill in the art would not combine the Vail Article, the Osawa Patent and the Kaneko Patent to create such an inefficient process asserted by the Examiner, which would sinter the core twice.

For all of the above reasons, a person of ordinary skill in the art would have no reason to combine the teachings of the Vail Article, the Osawa Patent and the Kaneko Patent to provide a method of manufacturing a sintered ceramic core for use in casting. The fact the Examiner relies on the Gonczy Patent, which is non-analogous art pertaining to the calcination of metal and is wholly irrelevant, to justify the Section 103 argument makes it more evident that the Examiner is employing impermissible hindsight. The fact the Examiner additionally employs an "Official Notice" to teach that "impregnation of the ceramic core with inorganic binder occurs over about 5 to 10 minutes," as recited by claims 6, 12 and 15, further highlights the impermissibly strained nature of the Examiner's Section 103 rejection.

While the Examiner assets that the Kaneko Patent discloses impregnation under vacuum, the Kaneko Patent provides no specific example where impregnation under vacuum is employed. In addition, the Kaneko Patent discloses that the selection of an impregnation method, such as impregnation under vacuum, depends on the porosity of the ceramic and the viscosity of the binder. In this case, the Examiner has failed to establish that the porosity of the ceramic disclosed by Vail and/or Osawa and the viscosity of the binder disclosed by Vail and/or Osawa is such that a person of ordinary skill in the art would be justified in applying impregnation by vacuum as the process for impregnating the ceramic core with the binder.

For all of the above reasons, the Examiner's Section 103 rejection is untenable and must be withdrawn because it lacks a proper teaching, suggestion, or incentive to make the

combination made by the inventor.

III. CONCLUSION

The Examiner has failed to establish a prima facie case of obviousness against Applicants' claimed invention because neither the Vail Article, the Osawa Patent, the Kaneko Patent, the Gonczy Patent nor the Gartland Patent teach, or suggest, either alone or in combination, multiple elements of the claims including "sintering the impregnated ceramic core in an atmosphere at 1100 degrees centigrade or more" and "the oxide ceramics reinforcing liquid is impregnated in a pressure reduced vessel" as recited by independent claims 1, 9 and 15. Furthermore, neither the Vail Article, the Osawa Patent, the Kaneko Patent, the Gonczy Patent nor the Gartland Patent teach, or suggest, either alone or in combination, additional multiple elements of the claim 15 including "the phenol resin forms a resin film on each powder grain that thermally decomposes at 200 to 400°C" and "preheating the impregnated ceramic core to about 200 to 400°C to thermally decompose the resin film."

In addition, the Examiner has failed to establish a prima facie case of obviousness against independent claims 1, 9 and 15 because the Examiner has employed at least six references, including the Gonczy Patent which is non-analagous art, to impermissibly create a mosaic of unrelated disclosures in an attempt to recreate a facsimile of the claimed invention.

For all of the above reasons, claims 1, 2, and 5-17 are in condition for allowance, and a prompt notice of allowance is earnestly solicited.

Questions are welcomed by the below signed attorney for the Applicants.

Respectfully submitted,

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